peculiarities which may either react upon each other, or the origin of which must be sought in a common source.

From two independent investigations come attempts to trace a connection between the amount of the Nile floods and the abundance or deficiency of the south-west monsoon rainfall in India. Mr. Willcocks broached this subject in a paper read before the meteorological congress at the World's Exposition in Chicago, and there suggested that famine years in India are generally years of low flood in Egypt, and that when the summer supply of the Nile had been deficient and late, a high flood might well follow, since the drought in the valley of the White Nile must create a powerful draught from the Indian Ocean or the Arabian Sea, a district in which is to be sought the origin of the massive current of the south-west monsoon. Unfortunately, any exact data to establish this interesting connection are not forthcoming, and can hardly be expected, since the Nile is supplied from two distinct sources, and it is impossible to separate and trace the effect of either contribution. Of the great lakes of Central East Africa which constitute a reservoir for the Nile waters, little is known as to the variation in their relative height due to the rainfall in their vicinity, which lasts from March to December. At Port Alice, on the Victoria Nyanza, and at some other stations, observations, more or less regular, are made of the variation in the heights of the water, but in the absence of any common datum level these heights are referred to that of the mean lake. Much surveying work and long-continued observations will have to be made before these scanty statistics can be turned to full account. Of the second source of supply to the Nile, viz. the flood waters in the Atbara, the Blue Nile and other rivers, fed during the rainy season from June to November, we know practically nothing as to their amount. But it is this seasonal supply which is probably the greatest factor in causing variations in the Nile floods, and where a connection with the causes of the Indian rains is closest. Whatever influences the flow of the monsoon current from the equator northwards over the Indian seas towards the heated regions of India and the Malay Peninsula must have a proportional effect on East Africa and South Arabia. With heavy monsoon rains, therefore, it is not unlikely that the contributing rivers add materially to the volume of the Nile waters, but it is not altogether a trustworthy guide to gauge the amount of water that enters the Nile by measuring the quantity that passes a particular station. Much water enters the Nile that never contributes to the irrigation of Egyptian lands. Of the amount lost by evaporation no account can be taken, but a source of greater error arises from the peculiar flatness of the ground about Shambé, which forms the apex of the swamp delta. Here the Nile can spread its waters over a large area, and practically lose itself as a river among the beds of reeds and rushes, which form a veritable swamp. Engineering works, already projected or actually begun, aim at clearing some or other of the feeding streams, such as the Bahr el Gebel or the Bahr el Zarab, and the effect must be, when completed, to break the continuity of such observations as have been made. Other sources of error are to be found in the varying quantity and character of the "sudd" which may interrupt the flow or diminish the amount of evaporation; but without insisting on too much accuracy, there exists a certain amount of evidence that the two great agricultural countries of Egypt and India are likely to be prosperous together or to suffer in common.

Mr. Eliot, the meteorological reporter to the Government of India, in his recent forecast of the probable character of the south-west monsoon rains of 1900, not only fully endorses Mr. Willcocks' statement, but adds some statistics which render a connection highly probable. Omitting a few local particulars from Mr. Eliot's statistical summary, the broad features are shown below.

| Year. | Variation of mean rainfall of year from normal. | Character of Nile flood. |
|---|---|---|
| | Inches | |
| 1876 | − 4·49 | Good high flood. |
| 1877 | − 4·28 | Poor flood. |
| 1891 | − 3·54 | Late flood. |
| 1896 | − 4·83 | Low Nile. |
| 1899 | − 11·14 | Very low flood: lowest of century. |

The years of excess of Indian rainfall tell a similar tale, even more distinctly.

| Year. | Rainfall variation in inches. | Character of Nile flood. |
|---|---|---|
| 1878 | +6·34 | Very severe flood: banks of river carried away in October. |
| 1886 | +3·02 | High flood. |
| 1892 | +5·09 | Very high and late flood. |
| 1893 | +9·07 | High flood. |
| 1894 | +6·47 | High flood. |

Having mentioned some of the causes which prevent a rigorous comparison between the Nile floods and the Indian rainfall, one is not unprepared to find some discrepancies; but Mr. Eliot certainly does not overstate his case when he contends that these tables indicate that in at least four out of five seasons in which there was a partial failure of the rains in India there was a low Nile, and that generally the two countries are similarly affected by the meteorological conditions and the variations of those conditions. The causes of these variations are obscure, and at present very imperfectly recognised, for a complete solution, as Mr. Eliot points out, demands a much more intimate knowledge of the atmospheric conditions that prevail over a large area. The meteorology of Australia and the Indian Ocean, and perhaps also of the Antarctic Ocean, must be linked on to that of the Indian monsoon area "before it will be possible to ascertain the missing factors necessary to complete the explanations of the relations between the chief features of the monsoon currents and rainfall of India and the antecedent and concurrent conditions in the Indian area and the regions to the south." To trace and anticipate the effect of weather conditions over the area that embraces both India and Egypt, in which our interests are so largely involved, should stimulate further inquiry, with the result of placing at the command of science additional means for dealing with so grave a problem.

## *THE FORTHCOMING MEETING OF THE BRITISH ASSOCIATION AT BRADFORD.*

IN the last article on the subject of the forthcoming meeting of the British Association an account was given of the handbook that is to be published in connection with the visit, and some information was furnished in regard to hotel and lodging accommodation. In the present article it is proposed to give a description of the excursions arranged by the local committee.

Following the custom of former years, it has been arranged that half-day excursions only shall take place on the Saturday, and that the whole-day excursions shall be reserved until the Thursday, when the serious work of the Association will be completed. The only exceptions to this are that the Mayor and Corporation are inviting a small party of engineers to visit their waterworks at Gowthwaite, in the Nidd Valley, and that a party exclusively for geologists will travel to Pateley Bridge by the

same train in order to visit the Brimham Rocks. These two excursions will occupy the whole of Saturday. The excursions, then, arranged for Saturday, September 8, are as follows :—

BOLTON PRIORY.—The party will leave the Bradford (Midland) Station at 1.32. Drive from Bolton to the Priory, where they will be received by the vicar, the Rev. A. P. Howes, who will give a brief description of its history and architecture. They will then drive forward along the banks of the Wharfe to the Wooden Bridge, where tea will be provided : an opportunity will be given for a visit to be made to the Strid (celebrated by Wordsworth), and then the party will be driven back to the station in order to reach Bradford in time for dinner. Mr. Geoffry Fison will be the leader of the excursion.

FARNLEY HALL.—The residence of the Fawkes family, which contains a wonderful collection of Turner's pictures. The Hall is of great historical interest, as it was the residence of Lord Fairfax in the time of the Civil War, and many relics of the period are shown. The party will leave the Midland Station at 1.15 for Otley, where they will be met by Major Mitchell, of Cayley Hall, the leader ; they will then be driven to Farnley, and as much time as possible will be spent in inspecting the Turner pictures and the beautiful old Hall. Major Mitchell will afterwards entertain the party to tea in his grounds, and they will then be driven back to the station.

ILKLEY.—The excursion will start from the Midland Station at 1.32, under the leadership of Mr. Mortimer Wheeler ; at Ilkley the party will be divided into several smaller bodies, who will in turn visit the Roman camp and fortifications, some curious Saxon crosses that are to be seen in the churchyard, and some remarkable instances of cup and ring marks, which are to be seen on Rombald's Moor above the village. At 4.30 the different parties will reassemble in the beautiful grounds of the Wells House Hydro, where they will be entertained to tea by the invitation of the directors. They will arrive back in Bradford about 7 o'clock.

HAWORTH.—The train will leave the Midland Station at 1.20, and the party will be met at Haworth by Mr. F. Greenwood, the president of the Brontë Society, who will escort them to the church and the Brontë Museum, and show them many places which will be familiar, from description, to the readers of "Shirley." The leader of the party will be Mr. J. A. Clapham.

KNARESBOROUGH.—Major H. D. Sichel will conduct a party to Knaresborough, the train leaving at 1.15. On arrival, the visitors will be divided into two parties, and, under the leadership of Major Sichel and Mr. Arthur Harris respectively, they will be taken by opposite routes to visit the Castle, the petrifying Dropping Well, and Eugene Aram's Cave. Afterwards they will be driven to Plumpton Rocks, where tea will be provided, and they will return by a train reaching Bradford about 7.30.

KIRKSTALL ABBEY AND ADEL.—The train will leave the Midland Station at 1.25, and Kirkstall Abbey will be described by Mr. E. Kitson Clarke, the leader. The visitors will then be driven to Adel Church, which is almost a unique instance of Saxon architecture, and which will be described by the vicar. They will then drive back to the Yorkshire College, Leeds, where they will be entertained to tea by the principal, Dr. Bodington, one of the vice-presidents of the Association.

PATELEY BRIDGE.—As indicated above, this is the only excursion extending over the whole day. Two parties will leave by a special train at 1.15, the one conducted by the Mayor (Mr. Wm. C. Lupton, J.P.), for a small party of engineers, who will be driven from Pateley to the Nidd Valley Waterworks ; the other, exclusively for geologists, who, under the leadership of Mr. J. Lower Carter, will walk to the Brimham Rocks, and visit other places of geological interest.

For the week-end (September 8–10), the Yorkshire Naturalists' Union are organising a specially interesting excursion. The district which has been selected is the neighbourhood of Grassington, in Upper Wharfedale, which is not merely a romantically picturesque region, but a remarkably good district for nearly all branches of natural history and geology. The excursion is intended, as far as possible, to be one strictly for practical working naturalists, and as accommodation is very limited, it will be needful to give preference to such members of the British Association as are likely to investigate in their own particular department. The arrangements will be under the direction of leading Yorkshire naturalists, who hope to introduce their comrades from other parts of the country to a remarkably interesting district. There will be the usual fully descriptive circular prepared, which will be sent to any one who may apply for it to the hon. secs. of the Yorkshire Naturalists' Union, Leeds.

THURSDAY, SEPTEMBER 15.—The whole-day excursions arranged for the concluding day of the meeting are as follows :—

THE ACKTON COLLIERY.—This excursion, which will be under the leadership of Mr. C. J. Cutcliffe-Hyne, is intended for a limited number of botanists, geologists and engineers, in order that some opportunity may be given them of examining the Yorkshire coal-measures. The party will be divided into two on arriving at Featherstone : the one will be taken down the pit, while the other will examine the machinery and various interesting material on the bank. They will then meet at one o'clock and will be entertained to lunch by Lord Masham, the owner of the mine, after which the proceedings will be reversed, and the respective parties will be taken round the bank and down the pit ; they will then reunite, and after partaking of afternoon tea will return to Bradford.

BOLTON PRIORY.—This is an amplification of the previous half-day visit, again under the leadership of Mr. Geoffry Fison. Fuller opportunities will be furnished of seeing the Priory and the Strid, and lunch will be provided at the Wooden Bridge. In the afternoon a visit will be made to Barden Tower, the ancient keep of the Lord Clifford, of the Wars of the Roses fame, and of his son, the Shepherd Lord.

RIPON AND FOUNTAINS ABBEY.—Mr. Mortimer Wheeler will conduct a party to Ripon ; after a special musical service at the Cathedral, they will be driven to Fountains Abbey, and lunch will be provided in the Refectory. They will then be taken over the ruins by the Dean of Ripon, after which the Marquis of Ripon will entertain the party to tea. On returning to Ripon, if time permits, they will be conducted to the crypt and the more interesting parts of the Cathedral by the Dean before leaving for Bradford.

SWINTON PARK.—By the invitation of Lord Masham and under the leadership of the Mayor, Mr. William Lupton, a party will visit Masham. On arrival, they will be driven to Jervaulx Abbey, the ruins of which, of course, possess great historical interest, and will then return to Lord Masham's residence, Swinton Hall, the drive each way being of extraordinary beauty. At the Hall they will be entertained to lunch by Lord Masham, after which the afternoon will be spent in inspecting the very fine collection of Old Masters and modern pictures, and the party will drive to the station to join the special train, which will convey also the party from Ripon.

MALHAM.—A party, under the leadership of Mr. Cecil Slingsby, will leave at an early hour for Bell Busk ; thence they will drive across country to Malham, and after lunch they will visit Gordale Scar, and, if time permits, at the invitation of Mr. Walter Morrison, M.P., they will go on to Malham Tarn and Malham Cove. They will leave Malham about 5 p.m. and drive to Skipton, visiting Skipton Castle on the way, and thence by train back to Bradford.

SETTLE AND CLAPHAM.—By the same train which conducts the party to Malham, another party will leave for Settle under the guidance of Mr. J. J. Brigg. After visiting the Victoria Caves, they will drive to Ingleton and lunch. From there they will walk through the beautiful grounds of Mr. J. A. Farrer and explore the Clapham Caves, in which most extraordinary specimens of stalactites and stalagmites are to be seen.

The two last excursions are specially intended for geologists.

YORK.—It is, of course, essential that York, where the first meeting of the British Association was held seventy years ago, should be visited. The party will arrive in York about 11 o'clock, under the leadership of Mr. J. A. Clapham. The visitors will immediately proceed to see the walls, the museum, and St. Mary's Abbey. Then, after lunch at the Station Hotel, they will visit the Minster, where most of the afternoon will be spent. By the invitation of the Lord Mayor, they will afterwards be entertained to tea at the Guildhall before leaving for the station.

For all the half-day excursions a uniform charge will be made, and similarly for Thursday's excursions there will also be a uniform charge. Visitors applying for excursions will be required to hand in this fee, together with the application form; and tickets, as nearly as possible in accordance with their preferences, will be allotted to them. By making all the excursions of equal cost, it is expected that the work of allotment will be simplified.

The next article will deal with the mayoral and civic functions that have been arranged, and some account will be given of the large garden-party which the municipality will hold on Monday, September 10, and of the various private garden-parties to be given on September 12.

RAMSDEN BACCHUS.

## NOTES.

WE regret to announce the death of Dr. John Anderson, F.R.S., the distinguished zoologist.

DR. D. MORRIS, C.M.G., the Imperial Commissioner of Agriculture for the West Indies, has just arrived in this country.

PROF. G. CAREY FOSTER, F.R.S., has been appointed Principal of University College. Prof. Foster is a Fellow of the College, and was formerly professor of Experimental Physics and Quain Professor of Physics; he is also a Fellow of the University of London, in which University he acted as examiner previous to his election to the Senate.

THE International Geological Congress is now in session at Paris. Among the items included in the programme are discussions on international co-operation in geology, fundamental researches for the establishment of a definitive classification, scheme for an international lexicon of petrology, and the photography of types of fossil species.

REUTER reports that Major Gibbons, the African traveller, reached Omdurman on August 20. The line of route traversed by the expedition represents a distance of 13,000 miles. Among the objects attained were the mapping of Barotseland; the accomplishment of the first steam navigation of the Middle Zambesi; and the tracing of the whole course of the river, the discovery of its source, and the determination of its watershed. Thence the route of the expedition was eastward, and by way of the Great Lakes and the Nile.

THE annual meeting of the English Arboricultural Society was held at Manchester last week. Prof. Somerville was appointed president for the ensuing year. Reports were read from the judges upon essays on "Foreign *versus* Native Timber," "Agricultural and Woodland Drainage," and "Thinning." The silver medal for the first essay was awarded to Mr. George Cadell, late of the Indian Forest Department, and bronze medals for the other essays were given to Mr. D. A. Glen, of Kirby, near Liverpool, and Mr. A. Dean, of Egham.

THE third annual report of the Council of the Röntgen Society shows that the society is making satisfactory progress. The demonstrations at the meetings are very valuable to all workers with Röntgen rays, and the papers and abstracts published in the *Archives* enable members who are unable to attend the meetings to keep well in touch with the latest developments of radiographic work. Dr. J. B. Macintyre, one of the earliest and most prominent investigators with Röntgen rays, has consented to be nominated as the next president of the society.

SIR WILLIAM STOKES, the eminent surgeon, died suddenly at Pietermaritzburg on Saturday. He filled the post of President of the Royal College of Surgeons of Ireland in 1896; and among his other appointments was the professorship of surgery in the Royal College of Surgeons in 1872, senior surgeon of the Government Hospital of Ireland in 1868, president of the Pathological Society of Ireland, and Surgeon in Ordinary to the Queen in Ireland from 1892. He was the author of a number of addresses, and contributions to the medical press, on clinical and operative surgery.

A REUTER telegram from St. Petersburg states that news has been received there from Dr. Sven Hedin, showing that his expedition this spring to Lob Nor to settle the various questions in dispute regarding that lake and its surroundings has resulted in discoveries exceeding his expectations. He found, in fact, that the lake known to previous explorers no longer exists, having dried up, leaving its bottom strewn with shells and marine growths. Around this old basin, however, a regular system of new lakes has been formed, which Dr. Sven Hedin has explored and mapped. In connection with this announcement, it is worth remark that at the time of the visit of Prince Henry of Orleans to Lob Nor, towards the end of 1889, the lake consisted of a number of interlacing lakes and river-arms, the contraction of the former large water-area being probably due to the using up of the waters of the Tarim for irrigation by the increasing population of the river basin.

THE *Scientific American* announces that the U.S. Congress has granted funds for the inauguration of agricultural experiment stations in the islands of Hawaii and Porto Rico. Prof. S. A. Knapp has been selected to investigate the agricultural conditions and possibilities of Porto Rico. He went to the island in June, and will study the lines of experimental investigation which should be undertaken there, places suitable for stations, and the approximate expense of inaugurating and maintaining the work. Dr. W. C. Stubbs will make a preliminary survey of the conditions in the Hawaiian Islands. He sailed for Hawaii about the middle of July, and will spend the month of August in the islands. The conditions there are somewhat different from those of Porto Rico, as a station for experiments in sugar production has been maintained by private beneficence for a number of years.

THE Berlin Academy of Science has (says *Science*) made the following grants for scientific work: Prof. Adolf Schmidt, of Gotha, for the collating and publication of material on terrestrial magnetism, 750 marks; Dr. Leonhard Schultze, of Jena, for investigations on the heart of invertebrates, 2000 marks; Prof. Emil Ballowitz, of Greifswald, for investigations on the structure of the organs of smell of vertebrates, 800 marks; Dr. Theodore Boveri, of Würzburg, for experiments in cytology, 500 marks;